

INSTRUCTIONS.

14th Edition.

Price 3d.

THE WATKINS

Bee Exposure Meter

(And Queen Bee).

Available for All Outdoor and Indoor Camera
Exposures.

The SPEED LIST is on a separate card. It is corrected and printed at frequent intervals. The latest edition can always be had for 3½d.

The WATKINS MANUAL gives the fullest particulars of systematic exposure and development and should be read in connection with these instructions

WATKINS METER CO., HEREFORD.



Disc Refill. With tint for Bee, Snipe, and all Watkins Watch-shaped Meters (post free 11d.)

Ribbon Refill. With tint for Standard and old Junior (post free 11d.)

Duplicate Instructions. For any meter (say which, (post free 3½d.)

Speed Card. (post free 3½d.)

NOTE.—That postage **must** be remitted for all orders and for letter reply to all enquiries, except where price list *only* is asked for. Foreign or Irish stamps not accepted. Where a meter is sent and has to be returned, home postage is 2d.

BEE METER—INSTRUCTIONS.

The instrument indicates the correct camera exposures to give under all conditions, the basis being an actual test of the light by the sensitive paper in the meter, this one test taking the place of the elaborate classification of time of day, year, position of subject, and state of weather in other calculators.

Three conditions or factors have to be taken into consideration, and a number or value assigned to each; they are :—

PLATE—The Sensitiveness of the plate.

STOP—The diaphragm or stop used.

LIGHT—The actinic force of the light falling on the subject.

Scales will be seen on the Meter for these three values, and a fourth scale, EXP., indicates the exposure.

In some exceptional subjects, another factor, the colour or character of the subject, has to be taken into consideration, and these exceptions are considered under the heading "Special Subjects."

The instrument is arranged to give correct indications of all subjects of *average colour*, such as landscapes, foliage, trees, buildings, portraits, groups, ordinary rooms, Church and other interiors, groups of flowers, etc.

The basis of calculation in the Watkins' system is a test of the light which is actually illuminating the

shadiest part of the subject to be photographed, and the first thing to do therefore, is

TO TEST THE LIGHT.

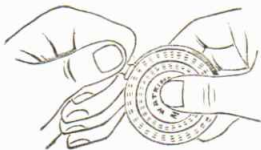
Hold the Meter to face *the source of the light which falls upon the subject*, not to face the subject, revolve the back lid of the Meter for just sufficient space to expose a fresh surface of sensitive paper through the aperture in lower part of dial, and at the same instant count "nought," continue counting "one, two, etc.," in seconds. The number of seconds taken for the paper to darken to the standard tint is the actinometer value. In testing the light, the depth of tint, not the colour, is the important point. The paper darkens rapidly in light ; up to a certain point it is *lighter* than the standard tint, after

this point it is *darker*. The point when it is neither darker nor lighter is that to be timed, and the judgment is greatly aided if the instrument is held at arm's length, and *the eyes half closed*. Make no attempt at great accuracy, a rough approximation is sufficient.

TO CALCULATE THE EXPOSURE.

Look out the speed of plate or film on the speed card.

Hold the meter by the handle in left hand, and with right thumb over the centre of glass and fingers at back. Grip the glass and the



back firmly together, and in this way the scales easily revolve together with the paper and back. Look at left hand side of meter, and by revolving the glass, set the diaphragm you are using (in column over STOP) against the plate speed (in column over PLATE).

Take the thumb away and look out the actinometer number (or nearest available value) in the column over LIGHT, and against this will be found on the outer scale, the correct exposure to give. The exposure scale extends almost round the outer circle, the plate number being utilised again as fractions. If the number indicated is 1, or to the right of 1, it is a whole number, if to the left of 1, it is a vulgar fraction, and has a dash against it. Thus '4 is

$\frac{1}{4}$, '130 is $\frac{1}{130}$. The exposure is indicated in *seconds* (or fractions of a second), when the light value is taken in seconds. But in the case of a poor light, where the actinometer takes more than 130 seconds, the light value is taken in minutes, and the exposure scale also indicates minutes or fractions of a minute. It is possible that, owing to the rounded edge of meter, some of the dashes will be missing, but all figures on the left hand side of outer ring are fractions.

It will be seen that when the meter is set for plate and stop, these values can be verified at a glance, and need not be altered for any number of exposures while the same plate and stop is used, and only the exposure number need be read against the actinometer value.

Examples—

Plate 90, Stop F/16, Act. 6=Exp. $\frac{1}{4}$ or $\frac{1}{4}$ second.

Plate 65, Stop F/28, Act. 16=Exp. 3 seconds.

Example—

With U.S. Dial—medium stop of F.P.K.

Plate 130, Stop 16, Light 32, Exp. 1 second.

When the exposure number is a fraction, it is wrong way up to the actinometer value.

For Studio work use the $\frac{1}{4}$ tint, for Interior work the $\frac{1}{8}$ th tint. See under Interiors.

FURTHER DETAILS

ACTINOMETER TEST.

The light which falls upon the worst lighted part of the subject in which detail is required in the negative is that to be tested. Where full detail is wanted in shadows in out-door work, the direct sun-light should not be tested, but the Meter should point to the sky in a direction at right angles to the sun's rays, which should not fall upon the paper. Where the shadows are not so important, it is a good plan to take the average between the sun light test and the sky test for the A number. It is only when there are no shadows of importance or in open landscape,

that the direct sunlight test should be taken for the A number.

Instances—

View under trees or in shady lane—expose actinometer under shade of trees.

Portrait, in or out of doors—expose actinometer in the place occupied by sitter.

Sunlit buildings or landscape partly in shadow—expose actinometer in the shadow, or the shade of your own body, if more convenient.

Sunlit landscape, or building with no shadow—expose actinometer in sunlight.

INTERIORS.

The Actinometer must always be exposed in the place occupied by the subject, not out of doors. But in order to save the time occupied in testing a weak light, a diaphragm may be used in the lens, of such a size that the camera exposure shall be equal to the actinometer exposure, and the light may be tested while the plate is being exposed. The table of diaphragm values to be used with different speeds of plates for this purpose will be found 3 pages on. But the use of the usual (full) tint provided on the meter is not convenient for this purpose, and therefore it is more convenient for interior work to expose the paper for just sufficient time to visibly

darken the paper, and to use the stop given in the table under $\frac{1}{16}$ th tint.

With plate speed 130, a stop of F/22 can be used in the lens, the actinometer laid down, facing the light (not the roof) in the worst lighted part in which full detail is wanted, the lens uncapped and the cap put on again as soon as the paper begins to discolour visibly (sixteenth tint). The discolouration of the paper may be seen by turning the back lid round and back a trifle, for an instant.

The Indoor dial (which fits the meter) carries a tint the same colour as the undarkened paper, and its figures calculate direct from this $\frac{1}{16}$ tint, so that any other stop than that mentioned in the table can be used with it.

STUDIO or dull light work.

For such work a painted tint to which the paper darkens in one quarter the time of the whole tint is useful. This "quarter tint" is not now provided on the usual meter face, as it confuses the observation. But it is provided on a separate dial, the figures of which calculate direct from it, or it can be used with a diaphragm of such a size that the exposure is equal to the actinometer time, for which see the table.

Example.—With the quarter tint and plate 130, the required stop is F/45. The Actinometer (with quarter tint) is laid down as described above, the lens uncapped, and the cap replaced when the paper darkens to the $\frac{1}{4}$ tint. This plan can be used for any dull light out of doors.

DIAPHRAGMS FOR INDOOR WORK.

P.	Whole tint.	Qtr. tint.	$\frac{1}{16}$ tint.
16	... $\frac{F}{3.2}$	... $\frac{F}{1.6}$	... $\frac{F}{.8}$
22	... $\frac{F}{4.0}$	... $\frac{F}{2.0}$	... $\frac{F}{1.0}$
32	... $\frac{F}{4.5}$	... $\frac{F}{2.2}$	... $\frac{F}{1.1}$
45	... $\frac{F}{5.6}$	... $\frac{F}{2.8}$	... $\frac{F}{1.4}$
65	... $\frac{F}{6.4}$	... $\frac{F}{3.2}$	... $\frac{F}{1.6}$
90	... $\frac{F}{8.0}$	... $\frac{F}{4.0}$	... $\frac{F}{2.0}$
130	... $\frac{F}{9.0}$	... $\frac{F}{4.5}$	... $\frac{F}{2.2}$
180	... $\frac{F}{11.2}$	... $\frac{F}{5.6}$	... $\frac{F}{2.8}$
250	... $\frac{F}{4.2.8}$	... $\frac{F}{6.4}$	... $\frac{F}{3.2}$
350	...	... $\frac{F}{8.0}$	... $\frac{F}{4.0}$
500	...	... $\frac{F}{9.0}$	... $\frac{F}{4.5}$

PLATE SPEEDS.

The plate numbers on speed card must be only regarded as approximate, and a guide to the first trial; for in the first place, few makes are always issued at the same sensitiveness and, in the second place, different workers vary in their idea of what a negative ought to be. The P number may be regarded as the "regulator" of the instrument, to be set fast or slow according to individual needs.

If at any time you get over-exposure, and feel sure you have rightly tested the light, increase your P number ; if under exposure decrease your P number.

SPECIAL SUBJECTS.

The BEE Meter is set for all objects of average colour (S100 on the standard meter), but for special subjects the following variations should be made from the indicated exposure.

Sky, or Sky and Sea, $\frac{1}{10}$ th the indicated exposure.				
Snow and Glacier	}	$\frac{1}{4}$,,	,,
scenes, white or				
black and white				
objects, sea views				
with shipping ...	}	$\frac{1}{4}$,,	,,
Light col'd objects				
open landscape no				
foreground, lake				
or water scenes...	}	$1\frac{1}{2}$,,	,,
Very dark coloured				
objects as old oak.	}	or twice	,,	,,

COPYING.

When copying pictures, near objects, or making lantern slides, the actual light falling upon the picture or negative must be tested as usual, and the exposure indicated by the meter multiplied or divided) in accordance with the table below. To use the table, it is necessary to measure the distance from lens to object in terms of the focus of the lens (a stick cut to the length of the focus of the lens is convenient for this purpose).

Thus, if with a 10 in. lens the distance from lens to a black and white picture is 55 inches, it would be "5½ times focus from lens," and in accordance with the table, you would give $\frac{8}{9}$ ths the exposure indicated

by the instrument. Where much copying, enlarging, and lantern slide making is done, the Standard Meter is invaluable for these purposes, as it has a special scale for the purpose.

U.S. DIAL FOR KODAKS, PREMOS, AND FRENAS.

Not marked with the usual F/- numbers, but with the U.S. numbers on stops of above cameras.

Interchangeable with the usual dial. For certain cameras with stops not so marked, special dials are issued, one dial for each camera. See full list. U.S. in this case does *not* mean American.

Top heading refers to negatives copied.

COPYING TABLE.					THIN NEG.	MED. NEG.	DENSE NEG.
					Black and White	Photo- graphs	Coloured Pictures or Objects
15	times	focus	from	lens	$\frac{1}{4}$	$\frac{1}{2}$	1
10	"	"	"	"	$\frac{1}{4}$	$\frac{5}{8}$	$1\frac{1}{4}$
$5\frac{1}{2}$	"	"	"	"	$\frac{1}{2}$	$\frac{3}{4}$	$1\frac{1}{2}$
$3\frac{1}{4}$	"	"	"	"	$\frac{2}{3}$	1	2
$2\frac{3}{4}$	"	"	"	"	$\frac{3}{5}$	$1\frac{1}{4}$	$2\frac{1}{2}$
$2\frac{1}{2}$	"	"	"	"	$\frac{4}{5}$	$1\frac{1}{2}$	3
2	{ " " " " }				1	2	4
2 { copying equal size }							

DIAPHRAGMS.

The subjoined table indicates (with practical though not absolute accuracy) the position of the U.S. Nos., Dallmeyer's and Zeiss Nos., and other stops. U.S. figures are marked on Kodak R.R. stops. Dallmeyer's lenses earlier than No. 43,000 do not bear these numbers.

U.S.			Dallmeyer's		Zeiss	
			Nos.		Nos.	
128	...	$\frac{F}{4.5}$	...	200	...	4
96	...	$\frac{F}{4.0}$	...	150	...	8
64	...	$\frac{F}{3.2}$	...	100	...	

U.S.

Dallmeyer's
Nos.Zeiss
Nos.

48	...	$\frac{F}{2.5}$	...	75	...	16
32	...	$\frac{F}{2.2}$	...	50	...	
24	...	$\frac{F}{2.0}$	...	40	...	32
16	...	$\frac{F}{1.6}$	...	25	...	
12	...	$\frac{F}{1.4}$	...	20	...	64
8	...	$\frac{F}{1.1}$	...	15	...	
6	...	$\frac{F}{1.0}$	...	10	...	128
4	...	$\frac{F}{.8}$	...	7.5	...	
3	...	$\frac{F}{.7}$	...	5	...	256
2	...	$\frac{F}{.5.6}$	...	3	...	

SHUTTER PHOTOGRAPHY.

The Meter will prove useful to calculate what shutter speed to use, or, if shutter speed is decided upon, the stop to use. It must however be remembered that the indication thus given is for *full* exposure, (the one giving the best results), and that half this is as much as is generally possible to give under the circumstances, indeed, one quarter the full exposure often passes muster as “good for a snap shot.”

In calculating for shutter exposures, therefore take for actinometer number *half* the value of the light test, and the exposure indicated will be the minimum efficient one.

The meter is also useful to ascertain the worst light in which it is safe to take Snap shots.

To do this, set plate speed against the value of the largest stop of your lens ; then against that fraction on exposure scale, which indicates the *slowest* shutter speed practicable to give, will be indicated the light required for a full exposure. And double this number indicates the slowest light in which you can work. If, therefore, in future, the light is worse than this it is useless to take snap shots. The largest opening of single lens snap shot cameras usually vary between F/12 and F/14 and the shutter speed may be about 1-32 nd.

The **SNAPSHOT METER** is much more convenient for above purposes than the usual pattern, its dial is *not* interchangeable with that in the Bee Meter

SENSITIVE PAPER.

(Each meter contains spare paper behind the pad).

The steadfast paper darkens slower if exceedingly dry, and quicker if very damp, and these extremes should be avoided by carrying in the pocket.

It is unreasonable to expect that any such exceedingly sensitive paper should keep indefinitely ; but so far it has shown excellent keeping qualities.

When adopting a new box of refills, always take off the old tint with its black paper mask and gum on the new one enclosed in the box. If the paper refuses to turn, see that the edges *of the pad are tucked within the back lid.*

TO CHANGE THE PAPER.

Open the Meter by holding as in previous illustration and pressing smartly with the thumb. Or it may be levered open with the back of a knife inserted between two halves of case. Do not throw away used paper, but put behind the pad, replacing by a new disc, yellow side towards glass. Change in dull indoor light. Only one disc must be in front of the pad.

The contents must be kept fairly tightly packed and no paper thrown away. In case of the glass turning when not required, clean the face of glass and inside of lid, as dirt makes it slip, also *stretch* pad by pulling with fingers before replacing.

DAYLIGHT ENLARGING.

Set the speed of the bromide paper as given on card to the stop used, and against the light figure (the light which falls on the negative) will be found the indicated exposure for a dense negative *without taking into account the increase for the enlarging factor.*

The exposure indicated by the Meter must therefore be multiplied by the following factors.

				Thin Neg.	Med. Neg.	Dense Neg.
Equal size	.....			1	2	4
Enlarging	$1\frac{1}{4}$ diameters			$1\frac{1}{2}$	3	6
"	2	"	...	$2\frac{1}{4}$	$4\frac{1}{2}$	9
"	$2\frac{1}{2}$	"	...	3	6	12
"	3	"	...	4	8	16
"	4	"	...	$6\frac{1}{4}$	$12\frac{1}{2}$	25

Enlarging from $\frac{1}{4}$ plate to whole plate would be 2 diameters.

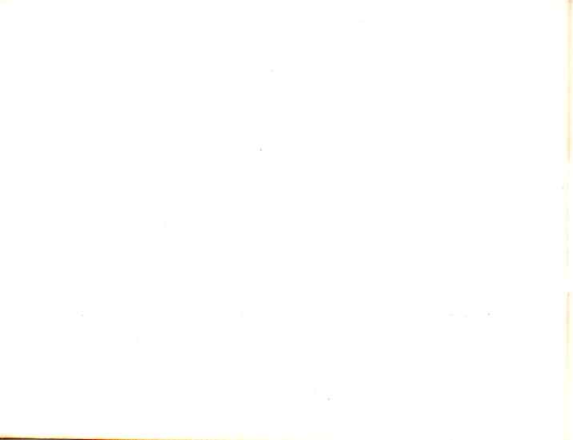
The simplest way for slide making and daylight enlarging is, first to test the light, then by trial and error (or above method) find the right exposure, and note how many actinometer tints the exposure is. Thus, if the exposure is 40 seconds and the actinometer test 10 seconds, *four tints* will in future be required in varying light, but with other circumstances alike.

Caution.—The exposure will vary enormously according to the density and fogginess (or otherwise of the negative).

THE SNIPE METHOD

Can be used with this Meter for a *rough test* to see if light is good enough for a snap, assuming that a Brownie or other single lens camera is used. Uncover the sensitive paper for FOUR seconds, counting nought *and* one, *and* two, *and* three, *and* four, shading instantly with the hand and then if paper has darkened to the tint, or nearly, or beyond it, a snap may be made. If the paper is not nearly as dark as the tint, a snap will be under-exposed and useless.

For V.P.K. (or F/11), expose for SIX instead of four seconds. For F/8 (full opening of R.R. lenses) expose for TWELVE seconds.



SOME OTHER HELPS.

QUEEN BEE METER. Hand made, silver plated special finish. Can be had with Snapshot scales.

SNAPSHOT METER. Special for hand camera work

SNIPE METER. Tells if light will do for snaps.

KINEMATOGRAPH METER. Specially designed for moving picture work.

SMALL CINE METER for Pathé Baby, Kodak, etc.

The WATKINS MANUAL. *The* handbook of Exposure and Development (Factorial or Thermo). 80,000 have been sold.

TIME THERMOMETER.

TIME TANKS.

Plates Developed Horizontally so that two or four can be developed. All sizes from Vest Pocket.

SHEATHS FOR FLAT FILMS OR FILM-PACKS to use with above tanks.

EXPOSURE NOTES. A Pocket Book, 3d. (post home $\frac{1}{2}$ d.)

PIGSKIN WALLET. For the above.

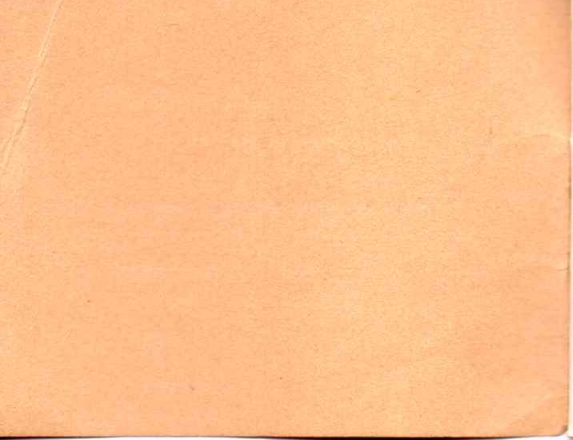
STANDARD METER. All figures engraved.

PINHOLE "LENS." With 5 apertures.

FACTORIAL CALCULATOR.

CHAIN PENDULUM. To count seconds.

WATKINS METER Co.,
HEREFORD, England.



**For explanation of any
difficulty consult the
WATKINS MANUAL.**

EXPOSURE NOTES
is also a help for
Systematic Work